Morbidity in early childhood: differences between girls and boys under 10 years old

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SUMMARY. The aim of the study was to investigate the differences in presented morbidity and use of health services among boys and girls in early childhood. The study was performed using data collected by the continuous morbidity registration project of the department of general practice at Nijmegen University. All recorded morbidity, referrals to specialists and admissions to hospitals were recorded by the registration project. The study population included children born in four practices from 1971 to 1984. The children were followed up until the age of five years and if possible until the age of 10 years. The morbidity of the children had been categorized into three levels of seriousness of diagnosis and 15 diagnostic groups as part of the registration project. Boys presented more morbidity than girls in the first years of their lives. For the age group 0–4 years this was true for all levels of seriousness of diagnosis except the most serious. In this younger age group significantly more boys than girls suffered respiratory diseases, behaviour disorders, gastroenteritis and accidents. Girls suffered from more episodes of urinary infection than boys in both age groups. More boys were referred to specialists and admitted to hosital than girls.

The findings of this study suggest that not only inborn factors can explain the sex differences in presented morbidity and use of health services in early childhood. In particular, differences between girls and boys in terms of non-serious morbidity and referral and admission rates suggest a different way of handling health problems in boys and girls in early childhood both by parents and doctors. It will be a challenge for future research to offer more understanding of these differences.

Keywords: sex influenced morbidity; health service utilization; referral rates; children and infants.

Introduction

THERE are differences between men and women in their morbidity, mortality and use of health services.[1,2] The life expectancy of women is longer[3,4] but they present with more illness[5-7] and make more extensive use of health care facilities.[8] This is true of all age groups except for the first years of life; morbidity surveys indicate that boys aged 0–4 years present more morbidity and use health care facilities more frequently than girls of the same age.[7,9-12] The analysis of the differences between girls and boys in these surveys tends not to differentiate between different types of illness but data demonstrating sex differences in a number of different diseases and complaints were recently reported by Butler and Golding in a national cohort interview study.[13]

In most cases general practitioners are the first to see children's health problems and it is important for them to be aware of the differences in the presentation of disease in girls and boys. The aim of this study was to analyse differences in morbidity between boys and girls aged 0–4 years and aged 5–9 years. The analysis focuses on the most common diseases seen in general practice. Referral rates and rates of admission to hospital among children in these age groups were also analysed.

Method

Continuous morbidity registration project

The data used in this study came from the continuous morbidity registration project of the department of general practice at the University of Nijmegen. The registration project has been in operation since 1967 in a stable population and details of the project have been described previously.[14,15] The registration project involves four general practices (seven general practitioners). The patient list of each practice is continuously updated. The following information is available for each patient: date of birth, sex, family composition and family social class. Every episode of illness presented to the general practitioner is included in the database. The episodes of illness were originally coded using an adapted form of the E-list.[16] Later a fourth digit was added, allowing use of the criteria of the *International classification of health problems in primary care (ICHPPC).*[17]

The general practitioner is responsible for classifying each episode of illness. Diagnoses made in specialist care after referral or following patients' contact with specialists on their own initiative are also included by their general practitioners. An episode of illness is defined according to the glossary of the World Organization of Family Doctors (WONCA) as 'the complete period of illness from onset until resolution'.[18] Repeated contacts for already classified episodes are therefore not recorded. Referrals for specialist care and hospital admissions are recorded under the relevant diagnosis.

Each year all patients with an identified episode of chronic illness in the previous calendar year, who have had contact with the doctor during that year are considered. The diagnosis is recoded as a prevalence code when the episode is still relevant to the patient's condition. There are guidelines for discontinuing the coding for chronic conditions: some conditions will remain a characteristic of patients throughout their life (for example malignancies) and can therefore be discontinued; others can be discontinued if, in the general practitioner's professional opinion, the disease has been cured (for example tuberculosis) or has disappeared (for example asthma or hypertension).

It is important that the quality and consistency of classification in the continuous morbidity registration project are maintained. The following points help to ensure that this is the case: classification takes place at the highest level of diagnostic understanding; if necessary, classification takes place after clarification of signs/symptoms (natural history, diagnostic

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procedures, specialist's opinion); random checks are made on collected data for illogical codes; monthly meetings of all the family physicians involved are held to discuss classification problems; coding problems of hypothetical case histories are discussed by the participating doctors.

All diagnostic rubrics used in the registration project have been assessed for their potential severity[15] by a group of experienced general practitioners as there was no standard of severity available. This procedure has been followed by other researchers.[19] Although the validity of the assessment cannot be substantiated, the allocation represents the consistent view of experienced general practitioners. The individual course of a disease is not taken into account. Three categories of severity were used: serious — the disease threatens the patient's life, or has a long term influence on his or her functional capacities, for example myocardial infarction or meningitis; moderately serious — the disease temporarily interferes with the patient's functional capacity, for example acute bronchitis or nephrolithiasis; not serious — the disease does not influence the patient's functional capacity, for example upper respiratory tract infection. Diagnostic rubrics which cover more than one disease could not be assessed for severity and were excluded from the registration project.

Morbidity in early childhood

All children born in the four practices in the period 1971–84 and registered for five years or more were selected for the study. A smaller number of these children were registered 10 years or more after birth. For all the children the number of episodes of illness per 1000 patient years was calculated for the first five years of life and for the smaller group the morbidity over the second five years of their lives was also calculated.

To compare morbidity in early childhood with morbidity in older age groups all episodes of illness for the total practice population over the period 1985–89 were analysed according to the degree of seriousness of the diagnosis. The data were analysed using the age groups 0–4 years, 5–14 years, 15–24 years, 25–44 years, 45–64 years, 65–74 years and 75 years and over.

In order to survey the important diagnostic categories in childhood such as skin diseases, 15 morbidity rubrics covering 90% of the morbidity of children in these age groups were aggregated. Referrals to specialists and admissions to hospital were recorded in relation to the referral diagnoses, grouped according to their degree of seriousness. Sex ratios were calculated by dividing the mean number of diagnoses, referrals and admissions for girls by the mean number of diagnoses, referrals and admissions, respectively, for boys.

Ninety five per cent confidence intervals were calculated and the chi square test used to demonstrate statistically significant differences between girls and boys.

Results

Over the registration period 1971–84, 810 girls and 886 boys were born in the four practices. A total of 736 girls (91%) and 801 boys (90%) were registered for five years from birth, and 497 girls (61%) and 542 boys (61%) for the first 10 years of their lives.

Table 1 shows the total number of episodes of illness per 1000 patient years for male and female patients in all age groups according to the degree of seriousness of the diagnosis. There were more serious episodes of illness recorded for male patients than for female patients. However, the serious episodes of illness represent only a small part of the total morbidity. There were many more episodes of moderately serious morbidity and particularly morbidity that was not serious. Morbidity that was classified as not serious was presented more often by female patients than by male patients except in the two youngest age groups. In childhood, boys presented more morbidity of all degrees of seriousness than girls.

In Table 2 the morbidity of the study population aged 0–4 years and 5–9 years is presented. Urinary infections were significantly more prevalent in girls than in boys ($P<0.001$). Most of the other diagnoses were presented more often by boys. In the 0–4 years age group the number of episodes classified as accidents, other upper and lower respiratory tract infection, acute otitis media and gastroenteritis for boys and girls were significantly different (all $P<0.01$). Behavioural disorders were also significantly more common among boys in this age group ($P<0.01$). In the older age group only the number of accidents was significantly higher for boys than girls ($P<0.001$). The total number of episodes of illness in this age group was lower than in the younger group; this remained true for all degrees of seriousness of the diagnosis.

Table 3 shows the referrals to medical specialists and the hospital admissions as a percentage of the total number of episodes of illness and according to the degree of seriousness of the diagnosis. In the age group 0–4 years approximately 7% of all episodes of illness were referred to a specialist: more than one third of the most serious diagnoses compared with approximately 4% of the non-serious diagnoses. In the age group 5–9 years, the referral rates were somewhat higher. In both age groups a higher proportion of boys were referred to specialists than girls. This difference was particularly large for non-serious morbidity among the younger children. Boys were also admitted

Table 1. Total number of episodes of illness per 1000 patient years, according to patients' age and sex and the seriousness of the diagnosis, for the population of the continuous morbidity registration project 1985–89.

	Total no. of episodes of illness per 1000 patient years by patients' age (years)						
Seriousness of diagnosis	0–4 ($n=3159$)	5–14 ($n=6372$)	15–24 ($n=10972$)	25–44 ($n=21197$)	45–64 ($n=12362$)	65–74 ($n=4243$)	75+ ($n=2813$)
Serious							
Male patients	53	29	27	28	66	198	424
Female patients	47	24	19	22	45	135	342
Moderately serious							
Male patients	702	471	417	553	577	561	634
Female patients	624	482	485	600	678	710	759
Not serious							
Male patients	1043	841	710	771	675	635	716
Female patients	948	831	979	1064	905	772	864

n = total number of patient years.

Table 2. Morbidity among study children aged 0–4 years and 5–9 years according to sex.

	Number of episodes of illness per 1000 patient years for children aged 0–4 years				Number of episodes of illness per 1000 patient years for children aged 5–9 years			
	Girls (*n* = 736/ 9310)	Boys (*n* = 801/ 11350)	Ratio of girls to boys (95% CI)		Girls (*n* = 497/ 3916)	Boys (*n* = 542/ 4579)	Ratio of girls to boys (95% CI)	
Total	2530	2834	0.89	(0.88 to 0.92)	1576	1690	0.93	(0.89 to 0.97)
Seriousness of diagnosis								
Serious	62	64	0.98	(0.82 to 1.2)	22	32	0.68	(0.48 to 0.97)
Moderately serious	922	1052	0.88	(0.84 to 0.92)	486	534	0.91	(0.84 to 0.98)
Not serious	1438	1580	0.91	(0.88 to 0.94)	978	1002	0.98	(0.92 to 1.03)
Not assessable	108	138	0.78	(0.64 to 0.96)	90	122	0.71	(0.59 to 0.85)
Diagnosis								
Infectious disease in childhood	230	214	1.1	(0.97 to 1.2)	206	170	1.2	(1.1 to 1.4)
Nervous function disorder	30	40	0.73	(0.57 to 0.94)	32	38	0.89	(0.65 to 1.2)
Behaviour disorder	2	6	0.20	(0.06 to 0.60)	–	–	–	
Enuresis	4	2	1.4	(0.58 to 3.5)	–	–	–	
Acute otitis media	206	252	0.82	(0.74 to 0.90)	94	116	0.81	(0.68 to 0.96)
Cold or influenza	746	812	0.92	(0.87 to 0.97)	352	348	1.0	(0.92 to 1.1)
Other upper respiratory tract infection	246	290	0.84	(0.76 to 0.92)	166	166	0.99	(0.91 to 1.1)
Lower respiratory tract infection	124	164	0.75	(0.66 to 0.85)	42	58	0.71	(0.55 to 0.92)
Gastroenteritis	136	162	0.84	(0.74 to 0.94)	40	44	0.89	(0.68 to 1.2)
Urinary infection	30	6	4.7	(2.9 to 7.4)	32	4	9.9	(4.8 to 21)
Eczema	46	44	1.0	(0.83 to 1.3)	12	8	1.5	(0.83 to 2.5)
All skin disease (except eczema)	296	302	0.98	(0.90 to 1.1)	218	222	0.99	(0.88 to 1.1)
Perinatal morbidity	24	24	1.0	(0.75 to 1.4)	–	–	–	
Congenital anomalies	18	26	0.71	(0.51 to 0.97)	–	–	–	
Accidents	176	238	0.74	(0.66 to 0.81)	162	246	0.66	(0.58 to 0.75)

n = total number of children/total number of episodes of illness. CI = confidence interval.

Table 3. Percentage of episodes of illness for which children were referred to specialists or admitted to hospital.

	Percentage of episodes of illness for children aged 0–4 years				Percentage of episodes of illness for children aged 5–9 years			
	Girls (*n* = 736/ 9310)	Boys (*n* = 801/ 11350)	Ratio of girls to boys (95% CI)		Girls (*n* = 497/ 3916)	Boys (*n* = 542/ 4579)	Ratio of girls to boys (95% CI)	
Referred to medical specialist								
Total	*6.2*	*7.7*	0.81	(0.73 to 0.90)	*8.6*	*10.5*	0.82	(0.72 to 0.93)
Serious diagnosis	*37.1*	*37.8*	0.98	(0.78 to 1.2)	*38.2*	*48.9*	0.78	(0.52 to 1.2)
Moderately serious diagnosis	*5.4*	*5.9*	0.92	(0.77 to 1.1)	*11.0*	*13.1*	0.84	(0.68 to 1.0)
Diagnosis not serious	*3.5*	*5.2*	0.67	(0.56 to 0.80)	*4.9*	*5.1*	0.95	(0.71 to 1.2)
Diagnosis not assessable	*33.1*	*36.2*	0.91	(0.76 to 1.1)	*30.2*	*33.1*	0.91	(0.71 to 1.2)
Admitted to hospital								
Total	*1.4*	*2.0*	0.68	(0.55 to 0.84)	*0.9*	*1.9*	0.49	(0.34 to 0.72)
Serious diagnosis	*21.4*	*21.7*	0.99	(0.70 to 1.4)	*14.5*	*26.1*	0.56	(0.27 to 1.2)
Moderately serious diagnosis	*0.9*	*1.3*	0.70	(0.45 to 1.1)	*1.5*	*1.2*	1.2	(0.63 to 2.3)
Diagnosis not serious	*0.3*	*0.6*	0.45	(0.25 to 0.81)	*0.1*	*0.6*	0.20	(0.06 to 0.67)
Diagnosis not assessable	*8.6*	*14.4*	0.60	(0.40 to 0.88)	*3.8*	*9.2*	0.41	(0.19 to 0.88)

CI = confidence interval. *n* = total number of children/total number of episodes of illness.

to hospital more frequently than girls. Among the boys 9.1% of all referrals and 13.7% of all admissions were due to sex-specific morbidity such as undescended testicles and phimosis. If the sex-specific morbidity is excluded for boys the sex ratio for referrals and admissions increases to 0.86 (95% confidence interval to 0.78 to 0.94) and 0.82 (95% confidence interval to 0.62 to 0.96), respectively.

Discussion

The results of this study demonstrate that the sex differences in morbidity in early childhood are different from the differences shown by other age groups. This agrees with the other results of morbidity surveys, such as the Netherlands morbidity surveys in general practice.[20] In a recent health interview survey[21] parents of children aged 0–4 years described the health of their sons as 'not so good' in 11.4% of cases compared with 6.3% for their daughters. Chronic conditions were mentioned for 10.9% of the boys and 6.7% of the girls. Over one year, drugs were prescribed for 19.1% of the boys and 13.0% of the girls. Similar patterns can be found in national studies in the United Kingdom.[9,10,13,22] In the third national morbidity study a distinction was also made between serious, moderately serious

and trivial diagnoses. However, in that study all 'other' diagnoses were classified as trivial. Many potentially serious diseases may be hidden in this category and in this study the diagnoses which could not be assessed had referral and admission rates close to those of serious disease.

Little is known about the cause of sex differences in mortality and morbidity. These differences can be related to congenital disorders or perinatal conditions, for example in the case of intrauterine or neonatal death.[23,24] Washburn and colleagues studied the differences in susceptibility to infections and found that infections were significantly more common in male than female patients, a difference which was most marked in infancy.[25] They suggested that their findings were consistent with the expectations of a genetic hypothesis concerning a gene locus on the x-chromosome. On the other hand, intercultural differences indicate that other more culturally defined causes can also have an influence.[26-28]

In this study we controlled for the degree of seriousness of diagnoses. The differences between boys and girls in the youngest age group were small in terms of number of episodes of serious morbidity, making it unlikely that genetic causes were the most important factor in explaining the differences in this respect. Larger differences between boys and girls in this age group were found for non-serious morbidity. This category contains mainly self-limiting diseases. The analysis of morbidity was, by definition, restricted to the episodes of illness which were brought to the attention of the general practitioner. In cases of self-limiting disease there is a high degree of freedom for parents to decide whether to contact the general practitioner or not. In previous studies in this population it was demonstrated that about 90% of episodes of morbidity reported in a diary were not presented to the general practitioner.[29,30] It is interesting that the recorded morbidity of boys was higher than that of girls. This is partly due to differences in physical factors, but the findings do not rule out the possibility of a difference in parental attitude with regard to the morbidity of their sons and daughters. However, it should be remembered that these findings do not allow any conclusions with regard to the appropriateness of presenting the complaint to the general practitioner.

A difference between boys and girls in the frequency of accidents has been reported to be more prominent in older children,[31] but in this study there is already a significant difference at infancy. This may be explained by the fact that boys are more likely to take risks during their play activities.[32]

An interesting finding was that in the youngest age group boys were referred to a specialist and admitted to hospital more often than girls. The differences in referral and admission rates were very small for serious morbidity but for less serious morbidity, the differences between girls and boys were more prominent. This might simply be due to differences in the nature of the presenting problems in boys and girls. However, it may be due to a difference in the general practitioner's approach and that of the consultant, to boys and girls, possibly influenced by the parents. The nature of the presented morbidity falls short of explaining this difference.

The findings of this study suggest that not only inborn factors can explain the sex differences in presented morbidity and use of health services in early childhood. In particular, differences between girls and boys in non-serious morbidity and differences in referral and admission rates suggest a different way of handling health problems in boys and girls in early childhood by both parent and physicians. It will be a challenge for future research to provide greater understanding of these differences.

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